A study on chemical composition, physical, tensile, morphological, and thermal properties of roselle fibre: Effect of fibre maturity

ABSTRACT

Roselle fibre is a type of natural fibre that can be utilized as a potential reinforcement filler in polymer composites for different applications. This work investigates the chemical, physical, mechanical, morphological, and thermal characteristics of roselle fibre at different levels of maturity (3, 6, and 9 months). The diameter of roselle fibre increases as the plant matures. However in contrast to this, the moisture content and water absorption of roselle fibre decrease as the plant matures. Chemical content of roselle fibres from plants of different ages indicate that as the plant matures, the cellulose content decreases. Tensile strength of roselle fibre decreases from 3 months old to 9 months old. The cross section of roselle fibre shows a typical morphology of bast fibre, where there is a lumen in the central of fibre.Thermal analysis results show that the effect of thermal decomposition of roselle fiber is almost the same for all plant ages. It is concluded that roselle fibres can be used as reinforced material for manufacturing of polymer composites. Based on its excellent properties, roselle fibres are suitable for different applications such as automotive and building components at lower cost.

Keywords: Roselle Fibre; Plant age; Physical properties; Mechanical properties; Chemical compositions; Thermal properties